

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of: Hessell et. al. Art Unit : 1764

Application No. : 09/898,844 Examiner : Ellen M. McAvoy

Filed : July 3, 2001

For: **COMPOSITIONS OF GROUP II AND/OR GROUP III BASE  
OILS AND ALKYLATED FUSED AND/OR POLYFUSED  
AROMATIC COMPOUNDS.**

**DECLARATION OF Dr. EDWARD T. HESSELL UNDER 37 C.F.R. § 1.132**

*Mtd  
All  
20  
Decl.  
2007*  
Commissioner of Patents and Trademarks  
P.O. Box 1450  
Alexandria, VA 22313-1450

Mail Stop: Amendment

I, Edward T. Hessell declare and state as follows:

1. I received a Bachelor of Science degree in Chemistry in 1984 from the University of Connecticut in Storrs, Connecticut. From 1984 to 1987 I worked as a research chemist for Ciba Geigy Corp. Thereafter, I was awarded a Ph.D. in Chemistry in 1991 from the University of Rochester in Rochester, New York. Upon receiving my doctorate, I was employed for three years as a Senior Chemist for Texaco Inc. specializing in research and development for additives in motor oils.
2. From 1994 to date, I have been employed by King Industries Specialty Chemicals in Norwalk, Connecticut. I was a Senior Research Chemist, Research and Development Manager for Lubricant Additives, and was promoted

to Manager for Specialty Markets in the Research and Development Division in 2002.

3. I have read and understand U.S. Patent Application 09/898,844, of which I am a co-inventor, and the Office Action dated May 16, 2007. I understand from the May 16, 2007 Office Action that the Examiner is relying on U.S. Patent No. 6,333,298 to Waddoups et al. ("the Waddoups patent") for teaching a "lubricating oil composition" that includes a Group III base oil.
4. I have read and understand the Waddoups patent and note that at column 2, lines 45-52 patentees expressly state that the "present invention" requires at least one calcium detergent:

"The present invention **requires** the presence of at least one calcium detergent. Detergents aid in reducing deposits that build up in an engine and act as an acid neutralizer or rust inhibitor. This in turn reduces engine wear and corrosion. The use of a calcium detergent in combination with the base stock oils in the composition of this invention offers fuel economy advantages as demonstrated by coefficient of friction data."

5. I have read and understand that the Waddoups patent prefers to use a calcium sulfonate as the required detergent (column 2, lines 55-56), typically in amounts of "from 0.5 to about 5 wt. %" based on the total weight of the composition (column 3, line 26-33).
6. Based on the results of the comparative test described infra, addition of a calcium sulfonate detergent to the compositions representative of the claimed invention would adversely affect the water separation characteristics of the those compositions.

**I. WADDOUPS REQUIRED CALCIUM DETERGENT  
ADVERSELY AFFECTS THE WATER SEPARATION  
PROPERTIES OF THE LUBRICANT COMPOSITION**

Preparation of the Compositions Under my direction, lubricant compositions representative of those described in U.S. Patent Application 09/898,844 were prepared, i.e., Example A, Example B and Example C. The base oil combinations of a Group III base oil and alkylated naphthalene covered a range of 50-90 wt % with regard to the Group III component:

- Example A included 50 wt. % of a Group III base oil;
- Example B included 70 wt. % of a Group III base oil; and
- Example C included 90 wt. % of a Group III base oil.

In Examples A, B and C, the alkylated naphthalene is an example of a commercial embodiment of the naphthalene claimed in U.S. Patent Application 09/898,844.

Comparative examples were prepared, and are designated Examples Comp A, Comp B, and Comp C. The comparative examples Comp A, Comp B and Comp C have similar quantities of the Group III base oil and alkylated naphthalene as Examples A, B and C, but have been adjusted to contain a 400 TBN overbased calcium sulfonate, as required and described by the Waddoups patent at column 2, lines 60-63. The concentration of the overbased calcium sulfonate was adjusted to the minimum value as specified in Waddoups patent, column 3, line 32-34 (0.112% calcium). The trade name, manufacturer/supplier and physical properties of the components are shown in Tables 1-3. The quantity of each lubricant component in the lubricant composition is shown in Table 4.

**TABLE 1. GROUP III BASE OIL**

Trade Name: Luvodur EHVI 80

Supplier: Lehmann & Voss & Company

Property	Value
Kinematic Viscosity @ 40 °C, cSt	50
Kinematic Viscosity @ 100 °C, cSt	8
Viscosity Index	128
Pour Point, °C	-15

**TABLE 2. ALKYLATED NAPHTHALENE**

The alkylated naphthalene used in the lubricant compositions is an example of a commercial embodiment of the alkylated naphthalenes in U.S. Patent Application 09/898,844, Table 2, alkylated naphthalene 1 (~ 48% didodecyl naphthalene, ~ 50 polydodecyl naphthalene and < 2% monododecyl naphthalene (GC)):

Tradename: N/A

Supplier: King Industries, Inc.

Property	Value
Kinematic Viscosity @ 40 °C, cSt	100
Kinematic Viscosity @ 100 °C, cSt	11.1
Viscosity Index (calculated)	97
Pour Point, °C	-23

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**TABLE 3. OVERBASED CALCIUM SULFONATE DETERGENT**

Trade Name: HiTEC 607

Supplier: Afton Chemical Company

<b>Appearance</b>	<b>Dark brown liquid</b>
<b>% calcium</b>	<b>15.4</b>
<b>TBN, mg KOH/g</b>	<b>410</b>
<b>Specific Gravity, g/ml</b>	<b>1.21</b>
<b>Viscosity @ 100 °C</b>	<b>110</b>

**TABLE 4. LUBRICANT COMPOSITIONS**

All values in weight percent

	<b>Group III Base Oil</b>	<b>Alkylated Naphthalene</b>	<b>Overbased Calcium Sulfonate Detergent</b>
<b>Example A – In accordance with US 09/898,844.</b>	50	50	0
<b>Example Comp A</b>	49.64	49.64	0.72
<b>Example B - In accordance with US 09/898,844.</b>	70	30	0
<b>Example Comp B</b>	69.50	29.78	0.72
<b>Example C- In accordance with US 09/898,844.</b>	90	10	0
<b>Example Comp C</b>	89.35	9.93	0.72

Evaluation of the Lubricant Compositions -Under my direction the compositions of the invention were analyzed by ASTM Standard Test Method D 1401,

"Water Separability of Petroleum Oils and Synthetic Fluids". A copy of this test procedure is attached as Exhibit 1. This test measures the ability of petroleum oils or synthetic fluids to separate from water. Water separation is a critical aspect of many oils used in both industrial and marine applications. The lack of water separation (also termed emulsification) reduces the lubricating properties of an oil and may also cause additive instability.

A test 40 mL sample of the lubricant composition is vigorously blended with an equal volume of distilled water for 5 minutes at 54 °C in a graduated cylinder. The time required for the emulsion thus formed to separate is recorded in 5 minute increments. If complete separation or emulsion reduction to 3 mL or less does not occur after standing for 30 minutes or some other specification time limit, the volumes of oil, water, and emulsion remaining at the time are reported in milliliters (mL) in the order mL oil/mL water/mL emulsion. The complete details of this test method can be found in "Annual Book of ASTM Standards Section 5, Petroleum Products , Lubricants, and Fossil Fuels", Vol. 05.01, pages 560-563, 2007, ASTM International, West Conshohocken, PA.

**II. RESULTS OF TESTS CONDUCTED ON THE LUBRICANT  
COMPOSITIONS OF TABLE 4 ARE REPORTED IN TABLE 5**

**TABLE 5. ASTM D 1401 RESULTS FOR LUBRICANT COMPOSITIONS**

Lubricant Composition	ASTM D 1401 Result Time, (Oil/Water/Emulsion)
Example A	5 minutes (41/39/0)
Example Comp A	60 minutes (10/0/70)
Example B	5 minutes (40/40/0)
Example Comp B	60 minutes (17/0/63)
Example C	5 minutes (40/40/0)
Example Comp C	60 minutes (20/0/60)

Photos of Example B and Example Comp B after 5 minutes and 60 minutes of settling are attached to further illustrate the difference in water separation properties.

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Figure 1. Example B (left) and Example B Comp (right) after 5 minutes of settling in ASTM D 1401 Water Separability Test



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Figure 2. Example B and Example Comp B after 60 minutes of settling in the ASTM D 1401 Water Separability Test



The results of the ASTM D 1401 test demonstrate that the lubricant compositions of U.S. Patent Application 09/898,844 show that the superior water separation properties of the claimed invention are adversely affected by the addition of a calcium sulfonate detergent, a required component of the Waddoups composition.

Date: 10/11/2007

*Edward T. Hessell*  
Edward T. Hessell, Ph.D.